

## REMARKS

Claims 1-29 are in the application. Claims 1, 8, 10, 20, 22, 25, 26, and 29 are in independent form.

Allowable Subject Matter

Claims 1 is indicated allowable if amended to overcome a rejection under 35 USC § 112 and claims 2-7, 10, 13, 20-22, 25, and 27 are indicated allowable if rewritten so as not to depend on rejected base claims. Claims 1 is amended to overcome the rejection under 35 USC § 112 and claims 2-7, 10, 13, 20-22, 25, and 27 are rewritten so as not to depend on rejected base claims.

Claim Objections

Claims 24 and 25 are objected to for being dependent upon the wrong claims. Claims 24 and 25 are amended to depend from claim 23.

Claim Rejections - 35 USC § 112

Claim 1 stands rejected under 35 USC § 112 for having insufficient antecedent basis for the term "spherical capacitor." Claim 1 has been amended to remove the term.

Claims 16, 17, 18, 19, and 22 stand rejected for insufficient antecedent basis for the term "Auger electrons." Claim 8 is amended to provide an antecedent basis for the term "Auger electrons" in claims 16-19. Claim 22 is also amended to provide an antecedent basis for the term "Auger electrons."

Claim Rejections - 35 USC § 102

Claims 8, 9, and 14 stand rejected under 35 USC § 102(e) as being anticipated by Ose et al. Applicants respond as follows. Amended claim 8 specifies "a secondary electron optical system for collecting the Auger electrons" and "an electron energy analyzer for analyzing the Auger electrons."

Ose et al. describes a system for collecting secondary electrons and backscattered electrons, not Auger electrons. Applicants submit that leaving out Auger electrons is not

an oversight by Ose et al: The system of Ose et al. does not appear capable of adequately collecting and analyzing Auger electrons.

As described in applicant's specification, "only a small number of the impacting electrons give rise to Auger electrons. Typically, somewhere between one thousand and one hundred thousand primary electrons are required to produce one Auger electron. To detect a material present in the sample at very low concentrations, it is necessary therefore to efficiently collect and analyze the Auger electrons. Auger electrons are emitted nearly isotropically, that is, approximately equally in all directions above the target, so it is necessary to collect Auger electrons from as much of the hemisphere above the sample as possible." Page 4, para. 1005.

Ose et al. does not provide a numerical value for the collection efficiency of secondary electrons, but there is no indication that it is adequate for Auger analysis and several indications that it is not. For example, Ose et al. states that "secondary electrons 109a and back scattered electrons 110a which are launched beyond the range of the fixed angle around the optical axis are deflected by the deflector 122, then colliding with the conversion electrode 113. The conversion electrode 113 produces the new secondary electrons when the secondary electrons 109a and the back scattered electrons 110a collide therewith." Col. 5, lines 47-54.

Moreover, the energy analyzer described in Ose et al. does not appear to be adequate for Auger analysis. In discussing FIG. 7, which includes an energy analyzer, Ose et al. states that the energy of secondary electrons extends from 0 to a few dozen volts and the prism electric field of the analyzer allows energy analyzes of such electrons with a resolving power of a few eV. Col. 8, lines 48-57. As describe in applicants specification, Auger electrons typically have energies from about 50 V or 100 V to 3000 V. Page 7, para. 1010. Moreover, it is desirable for Auger analyzer to have an energy analyzer that has a resolution ( $\Delta E/E$ ) of less than 1% and preferably better than or about 0.3%. Thus, the electron energy being analyzed by Ose et al. and its energy resolution indicate that Ose et al. is not used for Auger analyses.

In summary, the energy analyzer of Ose et al. appears to be inadequate for Auger analysis, and there is no indication that the collection efficiency is adequate for Auger analysis. The deficiency in Ose et al. as a reference for amended claims 8 cannot be

cured by combining Ose et al. with an Auger reference having a better electron energy analyzer, because there is no indication that Ose et al. has adequate collection efficiency for Auger analysis.

Claims 23, 24, and 26 stand rejection under 35 USC § 102(e) as being anticipated by U.S. Pat. No 6,455,848 to Krijn et al. 35 USC § 103(c) states that "Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

At the time the invention of the present application was made, the subject matter of U.S. Pat. No 6,455,848 was owned by or subject to an obligation of assignment to Philips Electron Optics B.V. which was 100% owned by FEI Company, the assignee of the present application. MPEP 706.02(I)(2), example 1, indicates that an invention of a wholly owned subsidiary is considered to be owned by the parent.

Attached is a Patent Assignment Abstract of Title showing that Krijn et al. assigned the application to Philips Electronics Optics B.V. Philips Electronics Optics B.V. changed its name to FEI Electron Optics B.V. An assignment from FEI Electron Optics B.V. to FEI Company was recorded at the PTO on August 19, 2002, reel number 013211, frame number 0995.

#### Claim Rejections - 35 USC § 103

Claim 11 stands rejected under 35 USC § 103 for obviousness over Ose et al. in view of U.S. Pat. No. 5,770,863 to Nakasuji. The examiner states that Ose et al. does not teach an electrostatic deflector, but Nakasuji demonstrates the use of an electrostatic deflector in a charged particle beam projection apparatus.

Nakasuji uses an electrostatic deflector to deflect a primary electron beam, but Nakasuji is a projection system and does not collect secondary electrons "through the objective lens." A person of ordinary skill would not use the deflector of Nakasuji "for deflecting the secondary electrons from the path of the primary beam" because the electrostatic deflector would also deflect the primary beam and adversely affect its

performance. This is particularly a problem for a system used for Auger analysis because the primary beam is typically of moderate energy and the Auger electrons can have energies that are a large fraction of the primary beam energy.

Of the two references (Ose et al and Krijn et al.) that do teach collecting electrons through the objective lens, both teach using a combination of magnetic and electrostatic fields, with the combination of fields adjusted so that the primary beam is not deflected by the combination of fields, while the secondary electrons, having lower energies, are deflected.

Amended claim 11 recites that the deflector comprises "an electrostatic detector and does not use a magnetic field for deflecting the secondary electrons from the path of the primary beam" to clarify that the deflector does not use a magnetic field for deflecting the secondary electrons from the path of the primary beam.

Regarding claim 19, the Examiner states that US Pat. No. 6,310,341 to Todokoro et al. teaches movement of the sample in the X and Y direction. Claim 19, however, recites raising and lowering the sample, that is, moving the sample in the Z direction. While the references show moving a sample in the X and Y direction to move the impact point of the charged particle beam on the work piece, the references do not show changing the height of the sample "for relatively higher scanning electron microscope spatial resolution, higher Auger spatial resolution, and higher Auger electron transmission."

New claim 29 recites a scanning electron microscope including an electron source, a beam scanning deflector for scanning the beam across a work piece, and a secondary particle deflector for deflecting the secondary particles from the path of the beam, with the secondary particle deflector being positioned closer to the electron source than the beam scanning deflector. Positioning the secondary electron deflector closer to the electron source causes the secondary electrons to be deflected by the beam scanning deflector as the primary beam is scanned across the work piece, increasing the collection efficiency.